

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Hein, Mich B.  
Hiatt, Andrew C.  
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(ii) TITLE OF INVENTION: TRANSGENIC PLANTS EXPRESSING ASSEMBLED  
SECRETORY ANTIBODIES

(iii) NUMBER OF SEQUENCES: 26

(iv) CORRESPONDENCE ADDRESS:

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(E) COUNTRY: US  
(F) ZIP: 92037

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk  
(B) COMPUTER: IBM PC compatible  
(C) OPERATING SYSTEM: PC-DOS/MS-DOS  
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: US  
(B) FILING DATE: 03-MAY-1996  
(C) CLASSIFICATION:

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: US 07/591,823  
(B) FILING DATE: 02-OCT-1990

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER: US 07/427,765  
(B) FILING DATE: 27-OCT-1989

(viii) ATTORNEY/AGENT INFORMATION:

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(B) REGISTRATION NUMBER: 33,950  
(C) REFERENCE/DOCKET NUMBER: 184.2

(ix) TELECOMMUNICATION INFORMATION:

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(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 18 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

5

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

10

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

15

CCTTGACCGT AAGACATG

18

(2) INFORMATION FOR SEQ ID NO:2:

20

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 22 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

25

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

30

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

35

AATTCATGTC TTACGGTCAA GG

22

(2) INFORMATION FOR SEQ ID NO:3:

40

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 33 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

45

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

50

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

TGTGAAAACC ATATTGAATT CCACCAATAC AAA

33

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 45 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

ATTTAGCACA ACATCCATGT CGACGAATTC AATCCAAAAA AGCAT

45

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 42 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

GGGGAGCTGG TGGTGAATT CGTCGACCTT TGTCTCTAAC AC

42

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 30 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

5 CCATCCCATG GTTGAATTCA GTGTCGTCAG 30

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

10 (A) LENGTH: 45 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

15 (ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

25 CTGCAACTGG ACCTGCATGT CGACGAATTC AGCTCCTGAC AGGAG 45

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

30 (A) LENGTH: 42 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

35 (ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

45 CCTGTAGGAC CAGAGGAATT CGTCGACACT GGGATTATTT AC 42

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

50 (A) LENGTH: 75 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

GAATTCATTC AAGAATAGTT CAAACAAGAA GATTACAAAC TATCAATTTT ATACACAATA 60  
TAAACGATTA AAAGA 75

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 90 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: N-terminal

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15  
Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30  
Ile Pro Ala Glu Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe  
35 40 45  
Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60  
Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val  
65 70 75 80  
Ser Leu Asp Leu Lys Arg Asp Val Val Leu  
85 90

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 90 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: N-terminal

5

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

10

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

15

Ile Pro Ala Glu Ala Val Ile Gly Tyr Ser Asp Leu Glu Gly Asp Phe  
35 40 45

20

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val  
65 70 75 80

25

Ser Leu Asp Leu Lys Arg Glu Val Glu Leu  
85 90

(2) INFORMATION FOR SEQ ID NO:12:

30

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 16 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

35

(ii) MOLECULE TYPE: peptide

(v) FRAGMENT TYPE: N-terminal

40

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Met Glu Leu Asp Leu Ser Leu Pro Leu Ser Gly Ala Ala Gly Gly Thr  
1 5 10 15

45

(2) INFORMATION FOR SEQ ID NO:13:

50

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 31 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

5

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

ACCAGATCTA TGGAATGGAC CTGGGTTTTT C

31

10

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 30 base pairs

(B) TYPE: nucleic acid

15

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

20

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

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(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

CCCAAGCTTG GTTTTGGAGA TGGTTTTCTC

30

30

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 31 base pairs

(B) TYPE: nucleic acid

35

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

40

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

45

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

GATAAGCTTG GTCCTACTCC TCCTCCTCCT A

31

(2) INFORMATION FOR SEQ ID NO:16:

50

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 30 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

5 (iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

10

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

AATCTCGAGT CAGTAGCAGA TGCCATCTCC

30

15 (2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 30 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

20

(ii) MOLECULE TYPE: DNA (genomic)

25

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

30

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

GGAAAGCTTT GTACATATGC AAGGCTTACA

30

35 (2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

40

(ii) MOLECULE TYPE: DNA (genomic)

45

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

50

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

GATCTATGGC TCTCTTCTTG CTC

23



(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 26 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

AATTCTTATT CCGCACTCTG CACTGC

26

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 3517 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

GGCCGGGGTT	ACGGGCTGGC	CAGCAGGCTG	TGCCCCGAG	TCCGGTCAGC	AGGAGGGGAA	60
GAAGTGGCCT	AAAATCTCTC	CCGCATCGGC	AGCCCAGGCC	TAGTGCCCTA	CCAGCCACCA	120
GCCATGGCTC	TCTTCTTGCT	CACCTGCCTG	CTGGCTGTCT	TTTCAGCGGC	CACGGCACAA	180
AGCTCCTTAT	TGGGTCCCAG	CTCCATATTT	GGTCCCGGGG	AGGTGAATGT	TTTGGAAGGC	240
GACTCGGTGT	CCATCACATG	CTACTACCCA	ACAACCTCCG	TCACCCGGCA	CAGCCGGAAG	300
TTCTGGTGCC	GGGAAGAGGA	GAGCGGCCGC	TGCGTGACGC	TTGCCTCGAC	CGGCTACACG	360
TCCCAGGAAT	ACTCCGGGAG	AGGCAAGCTC	ACCGACTTCC	CTGATAAAGG	GGAGTTTGTG	420

	GTGACTGTTG ACCAACTCAC CCAGAACGAC TCAGGGAGCT ACAAGTGTGG CGTGGGAGTC	480
	AACGGCCGTG GCCTGGACTT CGGTGTCAAC GTGCTGGTCA GCCAGAAGCC AGAGCCTGAT	540
5	GACGTTGTTT ACAAACAATA TGAGAGTTAT ACAGTAACCA TCACCTGCCC TTTCACATAT	600
	GCGACTAGGC AACTAAAGAA GTCCTTTTAC AAGGTGGAAG ACGGGGAACT TGTACTCATC	660
10	ATTGATTCCA GCAGTAAGGA GGCAAAGGAC CCCAGGTATA AGGGCAGAAT AACGTTGCAG	720
	ATCCAAAGTA CCACAGCAAA AGAATTCACA GTCACCATCA AGCATTTGCA GCTCAATGAT	780
	GCTGGGCAGT ATGTCTGCCA GAGTGGAAGC GACCCCACTG CTGAAGAACA GAACGTTGAC	840
15	CTCCGACTGC TAACTCCTGG TCTGCTCTAT GGAAACCTGG GGGGCTCGGT GACCTTTGAA	900
	TGTGCCCTGG ACTCTGAAGA CGCAAACGCG GTAGCATCCT TGCGCCAGGT TAGGGGTGGC	960
20	AATGTGGTCA TTGACAGCCA GGGGACAATA GATCCAGCCT TCGAGGGCAG GATCCTGTTC	1020
	ACCAAGGCTG AGAACGGCCA CTTCAGTGTA GTGATCGCAG GCCTGAGGAA GGAAGACACA	1080
	GGGAAGTATC TGTGCGGAGT CCAGTCCAAT GGTCAGTCTG GGGATGGGCC CACCCAGCTT	1140
25	CGGCAACTCT TCGTCAATGA AGAGATCGAC GTGTCCCGCA GCCCCCTGT GTTGAAGGGC	1200
	TTTCCAGGAG GCTCCGTGAC CATACGCTGC CCTACAACC CGAAGAGAAG CGACAGCCAC	1260
30	CTGCAGCTGT ATCTCTGGGA AGGGAGTCAA ACCCGCCATC TGCTGGTGGG CAGCGGCGAG	1320
	GGGCTGGTTC AGAAAGACTA CACAGGCAGG CTGGCCCTGT TCGAAGAGCC TGGCAATGGC	1380
	ACCTTCTCAG TCGTCTCAA CCAGCTCACT GCCGAGGATG AAGGCTTCTA CTGGTGTGTC	1440
35	AGCGATGACG ATGAGTCCCT GACGACTTCG GTGAAGCTCC AGATCGTTGA CGGAGAACCA	1500
	AGCCCCACGA TCGACAAGTT CACTGCTGTG CAGGGAGAGC CTGTTGAGAT CACCTGCCAC	1560
40	TTCCCATGCA AATACTTCTC CTCCGAGAAG TACTGGTGCA AGTGAATGA CCATGGCTGC	1620
	GAGGACCTGC CCACTAAGCT CAGCTCCAGC GGCGACCTTG TGAAATGCAA CAACAACCTG	1680
	GTCTCTACCC TGACCTTGGA CTCGGTCAGC GAAGATGACG AGGGCTGGTA CTGGTGTGGC	1740
45	GCGAAAAGACG GGCACGAGTT TGAAGAGGTT GCGGCCGTCA GGGTGGAGCT GACAGAGCCA	1800
	GCCAAGGTAG CTGTCGAGCC AGCCAGGTA CCTGTGACC CAGCCAAGGC AGCCCCCGCG	1860
50	CCTGCTGAGG AGAAGGCCAA GGCGCGGTGC CCAGTGCCCA GGAGAAGGCA GTGGTACCCA	1920
	TTGTCAAGGA AGCTGAGAAC AAGTTGTCCA GAACCTCGGC TCCTTGCGGA GGAGGTAGCA	1980
	GTGCAGAGTG CGGAAGACCC AGCCAGTGGG AGCAGAGCGT CTGTGGATGC CAGCAGTGCT	2040

	TCGGGACAAA GCGGGAGTGC CAAAGTACTG ATCTCCACCC TGGTGCCCTT GGGGCTGGTG	2100
	CTGGCAGCGG GGGCCATGGC CGTGGCCATA GCCAGAGCCC GGCACAGGAG GAACGTGGAC	2160
5	CGAGTTTCCA TCGGAAGCTA CAGGACAGAC ATTAGCATGT CAGACTTGGG GAACTCCAGG	2220
	GAGTTCGGAG CCATTGACAA CCCAAGCGCC TGCCCCGATG CCCGGGAGAC GGCCCTCGGA	2280
10	GGAAAGGATG AGTTAGCGAC GGCCACCGAG AGCACCCTGG AGATTGAGGA GCCCAAGAAG	2340
	GCAAAACGGT CATCCAAGGA AGAAGCCGAC CTGGCCTACT CAGCTTTCCT GCTCCAATCC	2400
	AACACCATAG CTGCTGAGCA CCAAGATGGC CCCAAGGAGG CCTAGGCACA GCCGGCCACC	2460
15	GCCGCCGCGG CCACCGCCGC CGCCGCGGCC ACCTGTGAAA ATCACCTTCC AGAATCACGT	2520
	TGATCCTCGG GGTCCCCAGA GCCGGGGGCT CAACCGCCCT GCACCCCCCA TGTCCCCACC	2580
20	ACCTAAACTT CCCTACCTGT GCCCAGAGGT GTGCTGGTCC CCTCCTCCAC GGCATCCAGG	2640
	CCTGGCTCAA TGTTCCTGTT GGGGTGGGGG TGTGAGGGGT TCCTACTTGC AGCCCGGTTC	2700
	TCCCGAGAGA AGCTAAGGAT CCAGGTCCTG AGGGAGGGGC CTCTCGAAGG CAGACAGACC	2760
25	AGAGAGGGGG GAGGAGCCCT TGGATGGGAG GCCAGAGGCG CTTTCCGGCC ACCCCCTCCC	2820
	TCCCTGCCCC CACCCTCCTT CCTTCATTCA AAAGTCCCAG TGGCTGCTGC CTAGGGTCCA	2880
30	GGCGCTGGCC GCACGCCTCC TCGAAGCCGT TGTGCAAAAC TCACTGGAGG AAGCCAGGGC	2940
	TCCTCCCGGG CTGTGTATCC TCACTCAGGC ATCCTGTCTT CCCCAGTATC AGGAGATGTC	3000
	AAGCCTCTGA AGGCTGTGTG CCCTGGGCGT GTCTGCAAGT CACCCAGAC ACATGTTCTC	3060
35	GCCATTTTAC AGATGAGAAC ACTGAGGTTG TACTCAAGGG CACCCTGCGA GATGGAGCAA	3120
	CAGCAAACTA GATGGGCTTC TGCTGTCCTC TTGGCCAGAG GTCTCTCCAC AGGAGCCCCCT	3180
40	GCCCCTGTAG GAAGCAGAGT TTTAGAACAT GGAAGAAGAA GAGGGGGATG GCCCTGGACG	3240
	CTGACCTCTC CCAAGCCCCC ACGGGGGAAA AGGCCCCCTC CTTTTCTGTC ACTCTCGGGG	3300
	ACCTGCGGAG TTGAGCATTC GTGCCCCGTG TGTCTGAAGA GTTCCAGTG GAAAGAAGAA	3360
45	AAGAGGGTGT TTGTCAGTGC CGGGGAGGGC CTGATCCCCA GACAGCTGAA GTTTAAGGTC	3420
	CTTGTCCTTG TGAGCTTTAA CCAGCACCTC CGGGCTGACC CTTGCTAACA CATCAGAAAT	3480
50	GTGATTTAAT CATTAAACAT TGTGATTGCC ACTGGGA	3517

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 1875 base pairs  
 (B) TYPE: nucleic acid  
 (C) STRANDEDNESS: single  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 1..1875

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

20	ATG GCT CTC TTC TTG CTC ACC TGC CTG CTG GCT GTC TTT TCA GCG GCC	48
	Met Ala Leu Phe Leu Leu Thr Cys Leu Leu Ala Val Phe Ser Ala Ala	
	1 5 10 15	
25	ACG GCA CAA AGC TCC TTA TTG GGT CCC AGC TCC ATA TTT GGT CCC GGG	96
	Thr Ala Gln Ser Ser Leu Leu Gly Pro Ser Ser Ile Phe Gly Pro Gly	
	20 25 30	
30	GAG GTG AAT GTT TTG GAA GGC GAC TCG GTG TCC ATC ACA TGC TAC TAC	144
	Glu Val Asn Val Leu Glu Gly Asp Ser Val Ser Ile Thr Cys Tyr Tyr	
	35 40 45	
35	CCA ACA ACC TCC GTC ACC CGG CAC AGC CGG AAG TTC TGG TGC CGG GAA	192
	Pro Thr Thr Ser Val Thr Arg His Ser Arg Lys Phe Trp Cys Arg Glu	
	50 55 60	
40	GAG GAG AGC GGC CGC TGC GTG ACG CTT GCC TCG ACC GGC TAC ACG TCC	240
	Glu Glu Ser Gly Arg Cys Val Thr Leu Ala Ser Thr Gly Tyr Thr Ser	
	65 70 75 80	
45	CAG GAA TAC TCC GGG AGA GGC AAG CTC ACC GAC TTC CCT GAT AAA GGG	288
	Gln Glu Tyr Ser Gly Arg Gly Lys Leu Thr Asp Phe Pro Asp Lys Gly	
	85 90 95	
50	GAG TTT GTG GTG ACT GTT GAC CAA CTC ACC CAG AAC GAC TCA GGG AGC	336
	Glu Phe Val Val Thr Val Asp Gln Leu Thr Gln Asn Asp Ser Gly Ser	
	100 105 110	
50	TAC AAG TGT GGC GTG GGA GTC AAC GGC CGT GGC CTG GAC TTC GGT GTC	384
	Tyr Lys Cys Gly Val Gly Val Asn Gly Arg Gly Leu Asp Phe Gly Val	
	115 120 125	
	AAC GTG CTG GTC AGC CAG AAG CCA GAG CCT GAT GAC GTT GTT TAC AAA	432
	Asn Val Leu Val Ser Gln Lys Pro Glu Pro Asp Asp Val Val Tyr Lys	

130

135

140

CAA TAT GAG AGT TAT ACA GTA ACC ATC ACC TGC CCT TTC ACA TAT GCG 480  
 Gln Tyr Glu Ser Tyr Thr Val Thr Ile Thr Cys Pro Phe Thr Tyr Ala  
 145 150 155 160

ACT AGG CAA CTA AAG AAG TCC TTT TAC AAG GTG GAA GAC GGG GAA CTT 528  
 Thr Arg Gln Leu Lys Lys Ser Phe Tyr Lys Val Glu Asp Gly Glu Leu  
 165 170 175

GTA CTC ATC ATT GAT TCC AGC AGT AAG GAG GCA AAG GAC CCC AGG TAT 576  
 Val Leu Ile Ile Asp Ser Ser Ser Lys Glu Ala Lys Asp Pro Arg Tyr  
 180 185 190

AAG GGC AGA ATA ACG TTG CAG ATC CAA AGT ACC ACA GCA AAA GAA TTC 624  
 Lys Gly Arg Ile Thr Leu Gln Ile Gln Ser Thr Thr Ala Lys Glu Phe  
 195 200 205

ACA GTC ACC ATC AAG CAT TTG CAG CTC AAT GAT GCT GGG CAG TAT GTC 672  
 Thr Val Thr Ile Lys His Leu Gln Leu Asn Asp Ala Gly Gln Tyr Val  
 210 215 220

TGC CAG AGT GGA AGC GAC CCC ACT GCT GAA GAA CAG AAC GTT GAC CTC 720  
 Cys Gln Ser Gly Ser Asp Pro Thr Ala Glu Glu Gln Asn Val Asp Leu  
 225 230 235 240

CGA CTG CTA ACT CCT GGT CTG CTC TAT GGA AAC CTG GGG GGC TCG GTG 768  
 Arg Leu Leu Thr Pro Gly Leu Leu Tyr Gly Asn Leu Gly Gly Ser Val  
 245 250 255

ACC TTT GAA TGT GCC CTG GAC TCT GAA GAC GCA AAC GCG GTA GCA TCC 816  
 Thr Phe Glu Cys Ala Leu Asp Ser Glu Asp Ala Asn Ala Val Ala Ser  
 260 265 270

TTG CGC CAG GTT AGG GGT GGC AAT GTG GTC ATT GAC AGC CAG GGG ACA 864  
 Leu Arg Gln Val Arg Gly Gly Asn Val Val Ile Asp Ser Gln Gly Thr  
 275 280 285

ATA GAT CCA GCC TTC GAG GGC AGG ATC CTG TTC ACC AAG GCT GAG AAC 912  
 Ile Asp Pro Ala Phe Glu Gly Arg Ile Leu Phe Thr Lys Ala Glu Asn  
 290 295 300

GGC CAC TTC AGT GTA GTG ATC GCA GGC CTG AGG AAG GAA GAC ACA GGG 960  
 Gly His Phe Ser Val Val Ile Ala Gly Leu Arg Lys Glu Asp Thr Gly  
 305 310 315 320

AAC TAT CTG TGC GGA GTC CAG TCC AAT GGT CAG TCT GGG GAT GGG CCC 1008  
 Asn Tyr Leu Cys Gly Val Gln Ser Asn Gly Gln Ser Gly Asp Gly Pro  
 325 330 335

ACC CAG CTT CGG CAA CTC TTC GTC AAT GAA GAG ATC GAC GTG TCC CGC 1056  
 Thr Gln Leu Arg Gln Leu Phe Val Asn Glu Glu Ile Asp Val Ser Arg  
 340 345 350

	AGC CCC CCT GTG TTG AAG GGC TTT CCA GGA GGC TCC GTG ACC ATA CGC Ser Pro Pro Val Leu Lys Gly Phe Pro Gly Gly Ser Val Thr Ile Arg 355 360 365	1104
5	TGC CCC TAC AAC CCG AAG AGA AGC GAC AGC CAC CTG CAG CTG TAT CTC Cys Pro Tyr Asn Pro Lys Arg Ser Asp Ser His Leu Gln Leu Tyr Leu 370 375 380	1152
10	TGG GAA GGG AGT CAA ACC CGC CAT CTG CTG GTG GAC AGC GGC GAG GGG Trp Glu Gly Ser Gln Thr Arg His Leu Leu Val Asp Ser Gly Glu Gly 385 390 395 400	1200
15	CTG GTT CAG AAA GAC TAC ACA GGC AGG CTG GCC CTG TTC GAA GAG CCT Leu Val Gln Lys Asp Tyr Thr Gly Arg Leu Ala Leu Phe Glu Glu Pro 405 410 415	1248
20	GGC AAT GGC ACC TTC TCA GTC GTC CTC AAC CAG CTC ACT GCC GAG GAT Gly Asn Gly Thr Phe Ser Val Val Leu Asn Gln Leu Thr Ala Glu Asp 420 425 430	1296
25	GAA GGC TTC TAC TGG TGT GTC AGC GAT GAC GAT GAG TCC CTG ACG ACT Glu Gly Phe Tyr Trp Cys Val Ser Asp Asp Asp Glu Ser Leu Thr Thr 435 440 445	1344
30	TCG GTG AAG CTC CAG ATC GTT GAC GGA GAA CCA AGC CCC ACG ATC GAC Ser Val Lys Leu Gln Ile Val Asp Gly Glu Pro Ser Pro Thr Ile Asp 450 455 460	1392
35	AAG TTC ACT GCT GTG CAG GGA GAG CCT GTT GAG ATC ACC TGC CAC TTC Lys Phe Thr Ala Val Gln Gly Glu Pro Val Glu Ile Thr Cys His Phe 465 470 475 480	1440
40	CCA TGC AAA TAC TTC TCC TCC GAG AAG TAC TGG TGC AAG TGG AAT GAC Pro Cys Lys Tyr Phe Ser Ser Glu Lys Tyr Trp Cys Lys Trp Asn Asp 485 490 495	1488
45	CAT GGC TGC GAG GAC CTG CCC ACT AAG CTC AGC TCC AGC GGC GAC CTT His Gly Cys Glu Asp Leu Pro Thr Lys Leu Ser Ser Ser Gly Asp Leu 500 505 510	1536
50	GTG AAA TGC AAC AAC AAC CTG GTC CTC ACC CTG ACC TTG GAC TCG GTC Val Lys Cys Asn Asn Asn Leu Val Leu Thr Leu Thr Leu Asp Ser Val 515 520 525	1584
55	AGC GAA GAT GAC GAG GGC TGG TAC TGG TGT GGC GCG AAA GAC GGG CAC Ser Glu Asp Asp Glu Gly Trp Tyr Trp Cys Gly Ala Lys Asp Gly His 530 535 540	1632
60	GAG TTT GAA GAG GTT GCG GCC GTC AGG GTG GAG CTG ACA GAG CCA GCC Glu Phe Glu Glu Val Ala Ala Val Arg Val Glu Leu Thr Glu Pro Ala 545 550 555 560	1680
65	AAG GTA GCT GTC GAG CCA GCC AAG GTA CCT GTC GAC CCA GCC AAG GCA	1728

Lys Val Ala Val Glu Pro Ala Lys Val Pro Val Asp Pro Ala Lys Ala  
565 570 575

GCC CCC GCG CCT GCT GAG GAG AAG GCC AAG GCG CGG TGC CCA GTG CCC 1776  
Ala Pro Ala Pro Ala Glu Glu Lys Ala Lys Ala Arg Cys Pro Val Pro  
580 585 590

AGG AGA AGG CAG TGG TAC CCA TTG TCA AGG AAG CTG AGA ACA AGT TGT 1824  
Arg Arg Arg Gln Trp Tyr Pro Leu Ser Arg Lys Leu Arg Thr Ser Cys  
595 600 605

CCA GAA CCT CGG CTC CTT GCG GAG GAG GTA GCA GTG CAG AGT GCG GAA 1872  
Pro Glu Pro Arg Leu Leu Ala Glu Glu Val Ala Val Gln Ser Ala Glu  
610 615 620

TA\* 1875  
625

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 624 amino acids  
(B) TYPE: amino acid  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Met Ala Leu Phe Leu Leu Thr Cys Leu Leu Ala Val Phe Ser Ala Ala  
1 5 10 15

Thr Ala Gln Ser Ser Leu Leu Gly Pro Ser Ser Ile Phe Gly Pro Gly  
20 25 30

Glu Val Asn Val Leu Glu Gly Asp Ser Val Ser Ile Thr Cys Tyr Tyr  
35 40 45

Pro Thr Thr Ser Val Thr Arg His Ser Arg Lys Phe Trp Cys Arg Glu  
50 55 60

Glu Glu Ser Gly Arg Cys Val Thr Leu Ala Ser Thr Gly Tyr Thr Ser  
65 70 75 80

Gln Glu Tyr Ser Gly Arg Gly Lys Leu Thr Asp Phe Pro Asp Lys Gly  
85 90 95

Glu Phe Val Val Thr Val Asp Gln Leu Thr Gln Asn Asp Ser Gly Ser  
100 105 110

Tyr Lys Cys Gly Val Gly Val Asn Gly Arg Gly Leu Asp Phe Gly Val

	115	120	125
5	Asn Val Leu Val Ser Gln Lys Pro Glu Pro Asp Asp Val Val Tyr Lys 130 135 140		
	Gln Tyr Glu Ser Tyr Thr Val Thr Ile Thr Cys Pro Phe Thr Tyr Ala 145 150 155 160		
10	Thr Arg Gln Leu Lys Lys Ser Phe Tyr Lys Val Glu Asp Gly Glu Leu 165 170 175		
	Val Leu Ile Ile Asp Ser Ser Ser Lys Glu Ala Lys Asp Pro Arg Tyr 180 185 190		
15	Lys Gly Arg Ile Thr Leu Gln Ile Gln Ser Thr Thr Ala Lys Glu Phe 195 200 205		
	Thr Val Thr Ile Lys His Leu Gln Leu Asn Asp Ala Gly Gln Tyr Val 210 215 220		
20	Cys Gln Ser Gly Ser Asp Pro Thr Ala Glu Glu Gln Asn Val Asp Leu 225 230 235 240		
25	Arg Leu Leu Thr Pro Gly Leu Leu Tyr Gly Asn Leu Gly Gly Ser Val 245 250 255		
	Thr Phe Glu Cys Ala Leu Asp Ser Glu Asp Ala Asn Ala Val Ala Ser 260 265 270		
30	Leu Arg Gln Val Arg Gly Gly Asn Val Val Ile Asp Ser Gln Gly Thr 275 280 285		
	Ile Asp Pro Ala Phe Glu Gly Arg Ile Leu Phe Thr Lys Ala Glu Asn 290 295 300		
35	Gly His Phe Ser Val Val Ile Ala Gly Leu Arg Lys Glu Asp Thr Gly 305 310 315 320		
40	Asn Tyr Leu Cys Gly Val Gln Ser Asn Gly Gln Ser Gly Asp Gly Pro 325 330 335		
	Thr Gln Leu Arg Gln Leu Phe Val Asn Glu Glu Ile Asp Val Ser Arg 340 345 350		
45	Ser Pro Pro Val Leu Lys Gly Phe Pro Gly Gly Ser Val Thr Ile Arg 355 360 365		
	Cys Pro Tyr Asn Pro Lys Arg Ser Asp Ser His Leu Gln Leu Tyr Leu 370 375 380		
50	Trp Glu Gly Ser Gln Thr Arg His Leu Leu Val Asp Ser Gly Glu Gly 385 390 395 400		



Leu Val Gln Lys Asp Tyr Thr Gly Arg Leu Ala Leu Phe Glu Glu Pro  
405 410 415

5 Gly Asn Gly Thr Phe Ser Val Val Leu Asn Gln Leu Thr Ala Glu Asp  
420 425 430

Glu Gly Phe Tyr Trp Cys Val Ser Asp Asp Asp Glu Ser Leu Thr Thr  
435 440 445

10 Ser Val Lys Leu Gln Ile Val Asp Gly Glu Pro Ser Pro Thr Ile Asp  
450 455 460

15 Lys Phe Thr Ala Val Gln Gly Glu Pro Val Glu Ile Thr Cys His Phe  
465 470 475 480

Pro Cys Lys Tyr Phe Ser Ser Glu Lys Tyr Trp Cys Lys Trp Asn Asp  
485 490 495

20 His Gly Cys Glu Asp Leu Pro Thr Lys Leu Ser Ser Ser Gly Asp Leu  
500 505 510

Val Lys Cys Asn Asn Asn Leu Val Leu Thr Leu Thr Leu Asp Ser Val  
515 520 525

25 Ser Glu Asp Asp Glu Gly Trp Tyr Trp Cys Gly Ala Lys Asp Gly His  
530 535 540

Glu Phe Glu Glu Val Ala Ala Val Arg Val Glu Leu Thr Glu Pro Ala  
545 550 555 560

30 Lys Val Ala Val Glu Pro Ala Lys Val Pro Val Asp Pro Ala Lys Ala  
565 570 575

35 Ala Pro Ala Pro Ala Glu Glu Lys Ala Lys Ala Arg Cys Pro Val Pro  
580 585 590

Arg Arg Arg Gln Trp Tyr Pro Leu Ser Arg Lys Leu Arg Thr Ser Cys  
595 600 605

40 Pro Glu Pro Arg Leu Leu Ala Glu Glu Val Ala Val Gln Ser Ala Glu  
610 615 620

45

(2) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

- 50 (A) LENGTH: 23 base pairs  
(B) TYPE: nucleic acid  
(C) STRANDEDNESS: single  
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

GATCTATGAA GACCCACCTG CTT

23

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

AATTCTTAGA CAGGGTAGCA AGA

23

(2) INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 480 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: cDNA

(iii) HYPOTHETICAL: NO

(iv) ANTI-SENSE: NO

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 1..480

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

	ATG AAG ACC CAC CTG CTT CTC TGG GGA GTC CTC GCC ATT TTT GTT AAG	48
	Met Lys Thr His Leu Leu Leu Trp Gly Val Leu Ala Ile Phe Val Lys	
	1 5 10 15	
5	GTT GTC CTT GTA ACA GGT GAC GAC GAA GCG ACC ATT CTT GCT GAC AAC	96
	Val Val Leu Val Thr Gly Asp Asp Glu Ala Thr Ile Leu Ala Asp Asn	
	20 25 30	
10	AAA TGC ATG TGT ACC CGA GTT ACC TCT AAA ATC ATC CCT TCC ACC GAG	144
	Lys Cys Met Cys Thr Arg Val Thr Ser Lys Ile Ile Pro Ser Thr Glu	
	35 40 45	
15	GAT CCT AAT GAG GAC ATT GTG GAG AGA AAT ATC CGA ATT GTT GTC CCT	192
	Asp Pro Asn Glu Asp Ile Val Glu Arg Asn Ile Arg Ile Val Val Pro	
	50 55 60	
20	TTG AAC AAC AGG GAG AAT ATC TCT GAT CCC ACC TCC CCA CTG AGA AGG	240
	Leu Asn Asn Arg Glu Asn Ile Ser Asp Pro Thr Ser Pro Leu Arg Arg	
	65 70 75 80	
25	AAC TTT GTA TAC CAT TTG TCA GAC GTC TGT AAG AAA TGC GAT CCT GTG	288
	Asn Phe Val Tyr His Leu Ser Asp Val Cys Lys Lys Cys Asp Pro Val	
	85 90 95	
30	GAA GTG GAG CTG GAA GAT CAG GTT GTT ACT GCC ACC CAG AGC AAC ATC	336
	Glu Val Glu Leu Glu Asp Gln Val Val Thr Ala Thr Gln Ser Asn Ile	
	100 105 110	
35	TGC AAT GAA GAC GAT GGT GTT CCT GAG ACC TGC TAC ATG TAT GAC AGA	384
	Cys Asn Glu Asp Asp Gly Val Pro Glu Thr Cys Tyr Met Tyr Asp Arg	
	115 120 125	
40	AAC AAG TGC TAT ACC ACT ATG GTC CCA CTT AGG TAT CAT GGT GAG ACC	432
	Asn Lys Cys Tyr Thr Thr Met Val Pro Leu Arg Tyr His Gly Glu Thr	
	130 135 140	
45	AAA ATG GTG CAA GCA GCC TTG ACC CCC GAT TCT TGC TAC CCT GAC TAA	480
	Lys Met Val Gln Ala Ala Leu Thr Pro Asp Ser Cys Tyr Pro Asp *	
	145 150 155 160	

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 159 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Met Lys Thr His Leu Leu Leu Trp Gly Val Leu Ala Ile Phe Val Lys

1

5

10

15

Val Val Leu Val Thr Gly Asp Asp Glu Ala Thr Ile Leu Ala Asp Asn  
 20 25 30

5

Lys Cys Met Cys Thr Arg Val Thr Ser Lys Ile Ile Pro Ser Thr Glu  
 35 40 45

10

Asp Pro Asn Glu Asp Ile Val Glu Arg Asn Ile Arg Ile Val Val Pro  
 50 55 60

Leu Asn Asn Arg Glu Asn Ile Ser Asp Pro Thr Ser Pro Leu Arg Arg  
 65 70 75 80

15

Asn Phe Val Tyr His Leu Ser Asp Val Cys Lys Lys Cys Asp Pro Val  
 85 90 95

Glu Val Glu Leu Glu Asp Gln Val Val Thr Ala Thr Gln Ser Asn Ile  
 100 105 110

20

Cys Asn Glu Asp Asp Gly Val Pro Glu Thr Cys Tyr Met Tyr Asp Arg  
 115 120 125

Asn Lys Cys Tyr Thr Thr Met Val Pro Leu Arg Tyr His Gly Glu Thr  
 130 135 140

Lys Met Val Gln Ala Ala Leu Thr Pro Asp Ser Cys Tyr Pro Asp  
 145 150 155

25  
 SCANNED